

Hybrid Q&A

Over the past few years, hybrid cars, SUVs and trucks have gone from being a fringe phenomenon to gaining mainstream acceptance from the motoring public, in large part because they offer immediate savings on fuel costs without relying on exotic and unproven technology. As familiar as hybrids have become, there are still some common misunderstandings about hybrids, that we address here:

1. What are the different kinds of electric hybrids, and how do they work?

Although there are several types of hybrid power systems available today, all three types combine two different power systems and two different sources of energy to “share the load” of moving a vehicle.

A *parallel hybrid* uses both an internal combustion engine and an electric engine working side-by-side to directly power the wheels, and is most efficient in highway driving. A *series hybrid* uses only the electric engine to power the wheels; the gasoline engine is used only to charge the vehicle’s batteries and power the electric motor. A series hybrid is most efficient in stop-and-go driving. A series/parallel drivetrain, available on many models today, combines the best efficiencies of both systems, and delivers the best overall fuel economy.

On a *mild hybrid*, the internal combustion engine shuts off when the vehicle is coasting, braking or stopped, then starts up immediately when the accelerator is pressed. In this system, the electric motor powers the vehicle’s systems while the internal combustion engine is shut off, but never actually drives the vehicle itself. Mild hybrid systems are lighter and less expensive than other types of hybrid, but only offer moderate improvements in fuel economy.

The key to all gas-electric and diesel-electric hybrids is the dual nature of the electric motor, which can use electric power from the batteries to drive the vehicle, and then reverse itself to use the vehicle’s mechanical energy to generate electricity to charge the batteries.

In all these configurations, the internal combustion engine is used to continuously or intermittently charge the hybrid’s all-important battery pack. In addition, most hybrids employ “regenerative braking,” in which some of the energy normally absorbed by the vehicle’s brakes while stopping is instead used to charge the batteries.

2. What is a plug-in hybrid?

A plug-in hybrid is one that offers the option of recharging the battery pack externally, by plugging the car into an electric outlet when it’s not in use; the batteries in

all other hybrids can only be charged by the vehicle's internal combustion engine or brakes while the vehicle is in operation.

Because they have bigger battery packs and can thus hold a bigger charge than traditional hybrids, plug-in hybrids can go up to 40 miles or more on electric power (hybrids on the market now can only go two to three miles on a charge). Because most Americans drive less than 40 miles a day, it is possible that a person could drive a plug-in hybrid for years without ever having to fill it with gas (provided he or she plugged it in to charge every night!).

3. Do I have to adopt new driving habits to get the most out of a hybrid?

No, although you may without realizing it. Some new hybrids feature interactive displays on the dashboard that encourage drivers to get the best mileage possible, although even a simple real-time miles-per-gallon readout has been known to cause drivers to change their behaviors to score higher numbers.

“Hyper-milers” are dedicated to achieving the best fuel economy possible in a hybrid vehicle. They do this by coasting and/or applying the brakes as early as possible before reaching an intersection (to shut off the internal combustion engine earlier and to best harness the brakes' ability to recharge the batteries), by accelerating slowly from a stop to keep the electric motor engaged for as long as possible before the internal combustion engine has to kick in, and by slipstreaming behind other vehicles to reduce their own wind resistance. Unfortunately, these practices are often an annoyance to other drivers, they can slow down traffic flow and cause congestion, and especially in the case of slipstreaming, they are potentially dangerous.

4. Will using hybrids affect my maintenance practices?

Yes. For starters, vehicle technicians need to be specially-trained to safely repair a car with a high voltage system. Blue cables under the hood or under the vehicle signify medium-voltage systems (60V or less), while orange cables signify high-voltage systems (higher than 60V). Both must be handled with extreme caution, and a technician must be certain that the vehicle's power system is completely shut down before repairing or maintaining the vehicle.

Because of their complicated power systems, hybrids have more computer controls than other vehicles, and so computer diagnostic tools and skills will become more important than ever.

In some respects, hybrids require less maintenance than other vehicles. Because a hybrid power system harnesses braking power to recharge the battery pack, brake wear is reduced dramatically, resulting in a significant reduction in brake maintenance expenses.

Similarly, reduced demands on the internal combustion engine will undoubtedly increase engine life.

5. *Will we have to replace the battery packs? How much will that cost?*

This is the great unknown where hybrids are concerned. It is too early to say how long a battery pack may last, or how much it will cost to replace, and because the technology is so new and is evolving so quickly, the manufacturers are reluctant to offer any estimates. Most manufacturers warranty their battery packs for eight to 10 years, and the earliest hybrids on the market—Toyota introduced the Prius in 2000—are just reaching that threshold.